ichneumons—*Stenomacrus intermedius*, Hlgr., and *S. cubiceps*, Thor. (according to Mr. Morley probably parasitic on the Mycetophilidæ)—were also very numerous in these two flowers. Eighteen of the latter species were shaken from two heads of one dandelion-plant. Any cross-pollination which takes place on Jan Mayen must be chiefly due to *C. lasiophthalmus* and the two ichneumons." (*Bristowe.*)

13. *Trichocera maculipennis*, Mg.

Recorded by Becher, not found by Mr. Bristowe.

14. *Trichocera lutea*, Becher.

Several females were obtained by Mr. Bristowe. They are dark in colour and do not show the yellow ground-colour described by Becher, whose specimens were doubtless either immature or discoloured by alcohol. The species is of interest on account of a peculiarity of venation, *r–m* being placed slightly *before* the fork of *Rs*.

"Found round a little pool at the base of the Säule rock. One had got drowned, and, though in the middle of the pool, was being scavenged by *Bdella littoralis*, Linn., a red mite very common on the island." (*Bristowe.*)

XXV.—*The Animal Ecology of King's College Chapel, Cambridge.—A Preliminary Note.* By A. D. Hobson, B.A., Christ's College, and L. H. Matthews, B.A., King's College *.

This paper is a consideration of the relationships of the animals living in the situation in question. The object is not primarily entomological, although many of the animals are insects.

The place under consideration is peculiar, and must first be described. The chapel has a double roof, the inner being the stone vaulting, while the outer is composed of wooden beams supporting the lead outer roof. There is a space between the two roofs extending over the whole of the chapel, and varying from 7 feet to 10 feet in height. This space, which is about 80 feet above the ground, communicates with the exterior by a window at each end. A gallery runs along either side at a slightly lower level, and has windows on the outside and openings leading to the inter-roof space on the inside.

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* From the Zoological Laboratory, Cambridge.

In addition to the animals inhabiting this space, the fauna of one of the four spiral staircases which communicate with it has been included. This staircase is disused, and is therefore similar biologically to the inter-roof space, as the pigeons, which form the central group of the fauna, are numerous there.

The whole floor of this space and the staircase are covered more or less with a débris derived from the pigeons, which nest and roost everywhere. This débris consists of droppings, together with derelict food, nesting materials, feathers, and remains of dead pigeons, forming a rich feeding-ground for a varied fauna.

Conditions at first sight appear unfavourable to life, owing to the extreme dryness of the food and to the darkness. On the other hand, so far as it has been possible to ascertain, the range of temperature is less than that outside.

An examination of the list given below shows that the majority of the animals found are dependent, directly or indirectly, upon the pigeons for food. It is found that the various members of the fauna fall into two main groups, as follows:—

I. *Independent Species.*

These merely use the chapel as a place of shelter, and obtain their food elsewhere:
e. g., pigeons, bats, and hibernating insects.

II. *Dependent Species.*

These fall into the following subgroups:—

A. *Parasites of Independent Species*:
e. g., ticks, fleas, bird-lice.

B. *Indirect Dependents.*

(*a*) Those feeding on the pigeon-refuse described above.
This group includes most of the fauna:
e. g., mites, *Lepisma,* larvæ of Coleoptera, Diptera, Lepidoptera, and Siphonaptera.

(*b*) Those preying on members of group (*a*) above:
e. g., spiders, Rhynchota, Chernetidea, and some mites.

It will be noted that some forms fall into more than one group at different stages in their life-history. Such an animal is the pigeon-flea, of which the larva feeds on refuse in the nests, whilst the adult is a parasite.

The following list includes all the members of this association which have so far been obtained. It is by no means complete, owing to the difficulty of collecting material because of the minute size of many of the animals. Indeed, additional species are continually turning up.

MAMMALIA.

Barbastella barbastellus, Gm. Barbastelle Bat.

The only mammal hitherto found. A single specimen was obtained from a crevice in the rafters on October 7th, 1922. This, incidentally, is the second recorded occurrence of this bat in Cambridgeshire.

AVES.

Columba livia. Pigeon.

Ecologically this is the most important animal, most of the fauna forming a " pigeon association " around it.

MOLLUSCA.

Helix arbustorum, L.

A single living example and one empty shell were taken in a dark part of the roof-space in August. This is the most anomalous member of the fauna, it being difficult to find any explanation for its presence owing to lack of suitable food.

ARACHNIDA.

ARANEINA.

Spiders are numerous in all parts, but, so far, have not been identified. There is reason to believe that they feed, in part at least, on the inhabitants of the pigeon refuse.

CHERNETIDEA.

Chernes sp.

One specimen only was found in rubbish. It is predaceous on refuse-feeders.

ACARINA.

Tyroglyphidæ.

Glycyphagus sp.

A species belonging to this genus is exceedingly abundant in the nests, and also, to a lesser extent, in the general refuse. These feed on particles of organic débris.

Aleurobius farinæ, De Geer.

Occurs in the same situation, and is similar in habits and food to *Glycyphagus.*

Liponyssus sp.

Found in moderate numbers amongst refuse. This is a predaceous species, feeding on the smaller refuse-feeders.

Dermanyssus spp.

Two species were found parasitic on pigeons, and were most abundant during the summer.

Several specimens of an undetermined Gamasid mite were taken on the barbastelle bat, chiefly on the head. These are blood-sucking parasites.

Argasidæ.

Argas reflexus, Fischer. Pigeon Tick.

Several specimens were found hiding in crevices of the masonry, in every case close to a pigeon's nest. It is a blood-sucking parasite of the pigeon. This is the second recorded locality in Great Britain, the species hitherto having been found only in Canterbury Cathedral. (See 'Nature,' vol. cx. p. 313.)

INSECTA.

LEPIDOPTERA.

Vanessa io. Peacock Butterfly.
Vanessa urticæ. Small Tortoiseshell Butterfly.

Hibernating specimens of both species not uncommon.

Tineidæ.

Larvæ of one or more species commonly found feeding in the refuse.

COLEOPTERA.

Staphylinidæ.

Small beetles of this family are not uncommon in the refuse, but have not yet been worked out. Specimens of *Oxytelus sculpturatus* and *O. complanatus*, collected in the chapel by H. Jenkinson, M.A., are among the University collections.

Dermestidæ.

Dermestes lardarius.

Common in both adult and larval stages during the summer, feeding on refuse and dead pigeons.

Cryptophagidæ.

Cryptophagus badius.

Both larvæ and adults very common in pigeon-refuse.

Ptinidæ.

Ptinus fur.

Both larvæ and adults very common in the refuse or on dead pigeons.

Tenebrionidæ.

Tenebrio molitor, L.

Larvæ and adults common in refuse. The larvæ are usually found feeding in very dry masses of pigeon-droppings mixed with vegetable matter round the nests.

DIPTERA.

Fannia sp. Latrine Fly.

Larvæ not generally common, but when found occur in large numbers. Apparently usually occurs in accumulations of wet droppings, and by a process of external digestion prevents the mass from drying up. The only refuse-feeding animal found which does not feed exclusively on dry material.

Calliphora erythrocephala. Blue-bottle.

Very common, the larvæ feeding upon dead pigeons.

SIPHONAPTERA.

Ceratophyllus columbæ. Pigeon Flea.

This species is very common in larval and adult stages in the nests during the summer; not so numerous in winter. The larvæ, as pointed out above, fall into the category of refuse-feeders, whilst the adults are blood-sucking parasites.

Ischnopsyllus hexactenus.

Three specimens were found on the barbastelle bat. This species is characteristically a parasite of the long-eared bat (*Plecotus auritus*).

MALLOPHAGA.

Esthiopterum columbæ.

Occurs abundantly on the pigeons.

Psocidæ.

One immature specimen only of an unidentified species found amongst refuse, on which it probably feeds.

RHYNCHOTA.

Anthocoris sp.

Not common. This bug is predaceous, and probably feeds, in part at least, on larvæ of *Tenebrio molitor.*

APTERYGOTA.

Lepisma saccharina.

Not uncommon amongst the refuse, on which it feeds.

As is evident from the above observations, the fauna under consideration is of a considerable complexity, and further work will probably show that it is even more complex. The existence of various species which prey upon the refuse-feeders indicates that this association has been well established for a long time.

In conclusion, we would wish to express our gratitude to Mr. F. Balfour-Browne for his continued help and kind encouragement, and also to Mr. C. Warburton, Dr. Hugh Scott, and Mr. M. G. L. Perkins for help in identification of species.